

FORM PTO-1390  
(REV. 9-2001)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

**20496-323**

U S APPLICATION NO. (If known, see 37 CFR 1.5)

10/088277

INTERNATIONAL APPLICATION NO.

**PCT/EP00/07431**

INTERNATIONAL FILING DATE . . .

**1 August 2000**

PRIORITY DATE CLAIMED

**17 September 1999**

TITLE OF INVENTION

## ROLL STAND

APPLICANT(S) FOR DO/EO/US

**Bernd BERGER, et al.**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau)
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3))
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 20 below concern document(s) or information included:**

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
- 1. PCT International Search Report (in German and English)**  
**2. PCT International Preliminary Examination Report (in German)**  
**Express Mail Label No. EL616646385US**

ICU Rec'd PCT/PTO 14 MAR 2002

U.S. APPLICATION NO. <b>10/088277</b>		INTERNATIONAL APPLICATION NO. <b>PCT/EP00/07431</b>		ATTORNEY'S DOCKET NUMBER <b>20496-323</b>					
21. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. .... <b>\$1040.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$890.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$740.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$710.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b>  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS PTO USE ONLY</b>          <table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;">\$</td> <td style="width:50%; border: none;"><b>890.00</b></td> </tr> <tr> <td style="border: none;">\$</td> <td style="border: none;"></td> </tr> </table>		\$	<b>890.00</b>	\$	
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Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;">\$</td> <td style="width:50%; border: none;"></td> </tr> </table>		\$			
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<b>CLAIMS</b>	<b>NUMBER FILED</b>	<b>NUMBER EXTRA</b>	<b>RATE</b>						
Total claims	<b>9</b> - 20 =	<b>0</b>	x <b>\$18.00</b>	\$					
Independent claims	<b>1</b> - 3 =	<b>0</b>	x <b>\$84.00</b>	\$					
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				\$					
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$	<b>890.00</b>				
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;">\$</td> <td style="width:50%; border: none;">-</td> </tr> </table>		\$	-		
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<b>SUBTOTAL =</b>				\$	<b>890.00</b>				
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;">\$</td> <td style="width:50%; border: none;"></td> </tr> </table>		\$			
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<b>TOTAL NATIONAL FEE =</b>				\$	<b>890.00</b>				
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +				<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;">\$</td> <td style="width:50%; border: none;"></td> </tr> </table>		\$			
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<b>TOTAL FEES ENCLOSED =</b>				\$	<b>890.00</b>				
				Amount to be refunded:	\$				
				charged:	\$				

a. ☐ A check in the amount of \$ \_\_\_\_\_ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. **16-2500** in the amount of \$ **890.00** to cover the above fees  
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any  
 overpayment to Deposit Account No. **16-2500**. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card  
 information should not be included on this form. Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR  
 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO  
**Proskauer Rose LLP**  
**Patent Department**  
**1585 Broadway**  
**New York, NY 10036**

**Phone: 212.969.3000**  
**Fax: 212.969-2900**

*Rachel S. Watt*  
 SIGNATURE **Rachel S. Watt**  
**Patent Agent**

NAME \_\_\_\_\_

**46,186**  
 REGISTRATION NUMBER

**Date: 14 March 2002**

**IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)**

Applicant	:	Bernd BERGER, et al.
Int'l Appl. No.	:	PCT/EP00/07431
Int'l. Filing Date	:	August 1, 2000
Priority Date	:	September 17, 1999
Title of the Invention	:	ROLL STAND (as amended)

**PRELIMINARY  
AMENDMENT**

Express Mail Mailing Label No. :

EL616646385US

Assistant Commissioner for Patents  
Box PCT  
Washington, DC 20231

Sir:

Prior to examination, please amend the above-identified patent application as follows:

**IN THE TITLE**

Please change the title to read: "ROLL STAND," as noted above.

**IN THE SPECIFICATION:**

Page 1, after the title, please insert --BACKGROUND OF THE INVENTION--.

Page 3, before the first full paragraph, which begins with "It is thus the object," please insert --SUMMARY OF THE INVENTION--.

Page 6, before the first full paragraph, which begins with "Below, the invention," please insert --BRIEF DESCRIPTION OF THE DRAWINGS--

Page 7, before the first full paragraph, which begins with "In the figures," please insert --DETAILED DESCRIPTION OF THE INVENTION--.

**IN THE CLAIMS:**

Please cancel claims 1-11 without prejudice and substitute the new claims 12-20 therefor, in accordance with 37 C.F.R. 1.121 (c)(1)(i).

--12. (New) A roll stand with a pair of work rolls (1, 2) for rolling a metal strip (B), comprising back-up rolls (8, 9, 10, 11) which provide lateral support to their respectively allocated work rolls (1, 2), with support forces directed towards the work rolls (1, 2) being able to be applied to said back-up rolls (8, 9, 10, 11) by means of several force generation devices which are arranged along said back up rolls (8, 9, 10, 11), and comprising support rolls or intermediate rolls (3, 4) which are borne by a chock (7) which can be slid into the roll stand (W1, W2) in the direction of the longitudinal axis of said chock, and wherein said chock can be withdrawn from said roll stand, with each support roll or intermediate roll supporting an associated work roll (1, 2) in a direction which is essentially perpendicular to the direction of movement of the metal strip (B), wherein the back-up rolls (8, 9, 10, 11) can be positioned from an idle position in which they are arranged outside the region where the chock (7) of the support roll or

intermediate roll (3, 4) moves during slide-in or withdrawal, to an operating position in which they rest against the work roll (1, 2), wherein the back-up roll (8, 9, 10, 11) is borne by a support beam (12, 13, 14, 15) and that the force generation device acts on this support beam (12, 13, 14, 15).

13. (New) The roll stand according to claim 12, wherein the force generation device moves the back-up roll (8, 9, 10, 11) from the idle position to the operating position.
14. (New) The roll stand according to claim 12, wherein the force generation device is a hydraulically or pneumatically operable actuating cylinder (20, 21, 22, 23).
15. (New) The roll stand according to claim 12, wherein the force generation device is a mechanically adjustable spindle.
16. (New) The roll stand according to claim 12, wherein a bearing arrangement (18) is provided in which the back-up roll (8, 9, 10, 11) is supported, at least in certain sections along its longitudinal extension, by the support beam (12, 13, 14, 15).
17. (New) The roll stand according to claim 16, wherein the bearing arrangement is provided by at least one hydrostatic bearing (18).

18. (New) The roll stand according to claim 16, wherein the bearing arrangement consists of roller bearings (118) which are arranged so as to be regularly spaced apart along the back-up roll (8, 9, 10, 11).
19. (New) The roll stand according to claim 13, wherein the support beam (12, 13, 14, 15) is divided into two detachably interconnected components (12a, 12b) in longitudinal direction of the back-up roll (8, 9, 10, 11), and the first component (12a) bears the back-up roll (8, 9, 10, 11) and the second component is coupled to the force generation device.
18. (New) The roll stand according to claim 16, wherein the first component which bears the back-up roll (8, 9, 10, 11) is held to the second component (12b) of the support beam (12, 13, 14, 15) so as to be slidable along the longitudinal direction of said first component.--

**IN THE ABSTRACT**

Please delete the last line which recites: "Fig. 1 is provided for the Abstract."



SI/cs 990516WO  
28 July 2000

6/PRTS

10/088277  
JC10 Rec'd PCT/PTO 14 MAR 2002

### Roll stand

The invention relates to a roll stand with a pair of work rolls for rolling a metal strip, comprising back-up rolls which provide lateral support to their respectively allocated work rolls, with support force directed towards the work rolls being able to be applied to said back-up rolls by means of a force generation device, and comprising support rolls or intermediate rolls which are borne by a chock, which can be slid into said roll stand in the direction of the longitudinal axis of said chock and wherein said chock can be withdrawn from the roll stand, with each support roll or intermediate roll supporting an associated work roll in a direction which is essentially perpendicular to the direction of movement of the metal strip.

In a roll stand known from DE 29 19 105 C2, each of the work rolls is supported on a support roll via an intermediate roll. At the same time, two back-up rolls are associated with each work roll, with said back-up rolls being arranged so as to rest against the respective work roll laterally at opposite sides. In the known roll stand, the support roll and the intermediate roll are held in a chock. At the same time beam-shaped support members for the back-up rolls are attached in an articulating manner. The lateral dimensions of the support member are limited to such an extent that the support members with the back-up rolls do not laterally protrude from the chock. In this way the chock constitutes a constructional unit together with the support roll, the intermediate roll and the back-up rolls as well as the associated support elements and bearing elements. For the purpose of maintenance and repair, this constructional unit can easily be withdrawn from the roll



The known embodiment of a six-roll stand as explained above, is associated with the advantage that the constructional unit comprising the chock and the components borne by it, is of compact design. This embodiment makes it possible to change this constructional unit within a short time. However, with the known roll stand it has been shown to be difficult in practical application to quickly exchange for example a support roll or one of the back-up rolls, because this always necessitates extensive installation work.

Apart from the state of the art as explained above, from the Austrian patent specification AT 359 459 a roll stand is known which provides three back-up rolls to support the work roll. The back-up rolls themselves are laterally supported by hydrostatic bearings, with three of said bearings being arranged, regularly spaced apart, along the respective work roll. Also, hydraulic cylinders are provided to apply the required support forces.

This roll stand known from AT 359 459 is associated with the problem of disassembly of the back-up rolls as well as the problem of adjusting the support forces in line with the respective loads occurring during rolling.

In a further development of the previously explained state of the art, as known from DE 33 24 562 C2, the back-up rolls are held in an articulated manner via a support member which supports the support rolls and

intermediate rolls. As is the case with the state of the art explained in the introduction, in this further development too, exchanging individual rolls is difficult and time-consuming.

It is thus the object of the invention to improve a roll stand of the type explained above, such that changing the rolls of the stand can be carried out more quickly and easily than is the case in the state of the art.

Starting with a roll stand of the type mentioned in the introduction, this object is met in that the back-up rolls can be positioned from an idle position in which they are arranged outside the region where the chock of the support roll or intermediate roll moves during slide-in or withdrawal, to an operating position in which they rest against the work roll.

According to the invention, the back-up rolls can be moved from the movement region of the chock carrying the support roll and if need be further rolls. In this way, the chock with the rolls held therein, can be removed from the roll stand, serviced and slid-in again, all independently of the back-up rolls. Similarly it is possible to service or replace the back-up rolls independently of the rolls of the chock.

The invention provides a further significant advantage in that it is no longer necessary to attune the spatial arrangement of the rolls borne by the chock to the necessity of an articulated bearing arrangement of the back-up rolls. The design space saved in this way makes it possible to provide support rolls, intermediate rolls and work rolls of increased diameter. For example, larger roll diameters can be provided compared to the state of

Furthermore, in line with their exposure to loads from the associated work roll, the intermediate rolls can be whipped so that the dimensional accuracy of the roll gap is further improved.

The invention can be achieved simply and economically in that the force generation device moves the back-up roll from the idle position into the operating position. In this embodiment of the invention, the force generation device not only provides the support forces but at the same time also serves as an actuating device by means of which the back-up rolls can be moved to the work rolls or retracted from them.

The required support forces can be generated with modest space and power requirements in that the force generation device is a hydraulically or pneumatically operable cylinder. By having one or several such cylinders acting upon each back-up roll, the forces required for supporting the back-up roll can be delivered precisely and with short reaction times. This makes it possible to influence the roll gap between the work rolls by applying precisely defined support forces to the back-up rolls.

A further advantageous embodiment of the invention provides for the respective back-up roll to be borne by a support beam and for the force generation device to act upon this beam. By having the force generation devices act upon the beam, support forces can be applied to the back-up rolls evenly without any sudden abrupt changes being experienced. This applies in particular where the bearing arrangement provides for the back-up roll to be supported, at least in certain sections along its longitudinal extension, by the support beam. If force generation devices are used which act at points upon the back-up rolls (for example actuating cylinders or comparable units which transfer the support forces via a plunger) then with the application of a support beam, according to the invention, a smaller number of force generation devices is sufficient, when compared to the state of the art, to achieve the desired gradual transition of the load generated by the individual devices. Furthermore, the use of the support beam makes possible a targeted whipping of the work roll and/or back-up roll.

A first bearing arrangement consists of roller bearings which are arranged so as to be regularly spaced apart along the back-up roll. As an alternative, the bearing arrangement can however also be provided by at least one hydrostatic bearing. Irrespective of the type of bearing arrangement, said bearing arrangement can be divided into individual segments, arranged along the respective back-up roll, said segments advantageously being associated with the respective force generation devices.

In so far as the support beam is divided into two detachably interconnected components in longitudinal direction of the back-up roll, wherein the first

- 6 -

component bears the back-up roll and wherein the second component is coupled to the force generation device, the back-up roll borne by the respective support beam can be replaced particularly simply and quickly. This applies in particular if the first component which holds the back-up roll, is held to the second component of the support beam so as to be slidable along the longitudinal direction of said first component.

Below, the invention is explained in more detail by means of a drawing showing an embodiment. The following are shown diagrammatically:

Fig. 1 a section view of a roll stand in a first operating position in a section along the direction of conveyance of the rolled metal strip;

Fig. 1a an enlarged view of a section A of Fig. 1;

Fig. 2 the roll stand according to Fig. 1 in a second operating position;

Fig. 3 the roll stand according to Fig. 1 in a section parallel to the direction of conveyance of the rolled strip;

Fig. 4 a section view of a second roll stand in a first operating position in a section along the direction of conveyance of the rolled metal strip; and

Fig. 5 the roll stand according to Fig. 4 in a second operating position.

In the figures, elements with the same function have the same reference characters.

Each of the roll stands W1, W2 has two work rolls 1, 2. In vertical direction each work roll 1, 2 is supported by an intermediate roll 3, 4 against a support roll (not shown) whose axis of rotation is in the same plane as the axes of rotation of the work rolls 1, 2 and the intermediate rolls 3, 4. The intermediate rolls 3, 4 are held in a chock 7 and the support rolls (not shown) are held in a chock of their own (also not shown), while the work rolls 1, 2 are loosely held in the roll stand W1, W2. Between the work rolls 1, 2 there is a roll gap W in which a metal strip B, conveyed in the direction of conveyance F, is cold rolled.

The chock 7 is slidably held on a slideway (not shown); said chock can be withdrawn from the respective roll stand W1, W2 along its longitudinal direction, parallel to the axes of rotation of the work rolls, intermediate rolls and support rolls.

Each work roll 1, 2 comprises two back-up rolls 8, 9; 10, 11 of which one side is associated with the work roll 1, 2. In each case the back-up rolls 8, 9; 10, 11 are borne by a support beam 12, 13, 14, 15.

Each of the support beams 12, 13, 14, 15 is divided into two components 12a, 12b, wherein the plane of osculation is arranged vertically, extending parallel to the plane of the axes of rotation of the work rolls 1, 2, the intermediate rolls 3, 4 and the support rolls (not shown). The second component 12b of the respective support beam 12, 13, 14, 15 bears the back-up roll 8, 9, 10 or 11, associated with said support beam 12, 13, 14,

15. By way of a guide rail 12c at the respective first component 12a and by way of attachment bolt 16, the respective second component 12b is held to the first component 12a so as to be slidable in longitudinal direction, so that it can be withdrawn from the respective roll stand W1, W2 together with the back-up roll 8, 9, 10, or 11 borne by it.

In the embodiment according to figures 1, 2 and 3, for lateral support of the back-up rolls 8, 9, 10 or 11, along the back-up rolls 8, 9, 10 or 11, hydrostatic bearings 18 are arranged so as to be regularly spaced apart. The bearings 18 are supported by the respective support beams 12, 13, 14, 15 and are supplied with pressure fluid by way of a supply line 19 in the second component 12b of the respective support beam 12, 13, 14, 15.

In the embodiment according to Figures 4, 5, roller bearings 118 are arranged at regular spacing at the support beams 12, 13, 14, 15, to provide lateral support of the back-up rolls 8, 9, 10 or 11, along the back-up rolls 8, 9, 10 or 11. The roller bearings 118 are also supported by the respective support beam 12, 13, 14, 15.

Each support beam 12, 13, 14, 15 is associated with several hydraulically operated actuating cylinders 20, 21, 22, 23, regularly spaced apart along the respective support beam 12, 13, 14, or 15, said actuating cylinders being attached at the pillars 24 or 25 of the roll stand W1, W2, said pillars being arranged on the side of the chock 7. The pistons 20a, 21a, 22a, 23a of the actuating cylinders 20, 21, 22, 23 are coupled to the first component 12a of the respective support beam 12, 13, 14 or 15. Each of the movement axes X of the pistons 20a,

21a, 22a, 23a is arranged so as to be inclined in the direction of the roll gap w.

There is a free space R between the respective place of attachment of the actuating cylinders 20, 21, 22, 23 and the space in which the chock 7 is moved during sliding in or withdrawing. The depth of this free space R and the actuating path of the pistons 20a, 21a, 22a, 23a are such that when the pistons 20a, 21a, 22a, 23a are fully withdrawn, the support beams 12, 13, 14, 15 borne by them, including the respective back-up rolls 8, 9, 10 or 11 held on them, are situated in said free space R (Fig. 2, Fig. 5). In this position of the pistons 20a, 21a, 22a, 23a and the interconnected support beams 12, 13, 14, 15, the chock 7 including the intermediate rolls and support rolls 3, 4 (not shown) held in said chock 7, can be withdrawn from the roll stand W1 or W2 without there being any danger of a collision with the back-up rolls 8, 9, 10, 11.

In order to exchange the back-up rolls 8, 9, 10, 11, the respective second component 12b is withdrawn along the guide rail 12c, from the respective first component 12a of the support beam, said first component of the support beam 12, 13, 14, 15 being connected to the respectively associated piston 20a, 21a, 22a or 23a. This can take place with the chock 7 withdrawn. To this effect, the back-up rolls 8, 9, 10, 11 with the support beams 12, 13, 14, 15 are moved to the respective free space R so that the chock 7 can be withdrawn from the roll stand W1 or W2 without hindrance.

As an alternative, the back-up rolls 8, 9, 10, 11 can also be withdrawn from the roll stand W1 or W2 together with the chock 7. To this effect the support beams 12,



In the case of back-up rolls 8, 9, 10, 11 put in position against the work roll 1, 2, the actuating cylinders 20, 21, 22, 23 generate the support force by means of which the back-up rolls 8, 9, 10, 11 are supported on their respective side facing away from the respective work roll 1, 2, by means of hydrostatic bearings 18 or roller bearings 118. The support forces generated by the actuating cylinders 20, 21, 22, 23 along the respective support beam 12, 13, 14, 15, can be set such that a particular geometric shape of the roll gap W is achieved by corresponding whipping of the respective back-up rolls 8, 9, 10, 11 or work rolls 1, 2.

LIST OF REFERENCE CHARACTERS

W1, W2	Roll stands
1, 2	Work rolls
3, 4	Intermediate rolls
7	Chock
8, 9, 10, 11	Back-up rolls
12, 13, 14, 15	Support beams
12a, 12b	Components of the support beams 12, 13, 14, 15
12c	Guide rail
16	Attachment bolt
18	Hydrostatic bearings
19	Supply line
20, 21, 22, 23	Actuating cylinders
20a, 21a, 22a, 23a	Pistons
24, 25	Pillars of the roll stand W1, W2
118	Roller bearings
B	Metal strip
F	Direction of conveyance
R	Free space
W	Roll gap
X	Movement axis of the pistons 20a, 21a, 22a, 23a

[illegible]

11

## CLAIMS

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characterised in that

the back-up rolls (8, 9, 10, 11) can be positioned from an idle position in which they are arranged outside the region where the chock (7) of the support roll or intermediate roll (3, 4) moves during slide-in or withdrawal, to an operating position in which they rest against the work roll (1, 2).

2. The roll stand according to claim 1, characterised in that the force generation device moves the back-up roll (8, 9, 10, 11) from the idle position to the operating position.

- 2 -

3. The roll stand according to one of the preceding claims, characterised in that the force generation device is a hydraulically or pneumatically operable actuating cylinder (20, 21, 22, 23).
4. The roll stand according to one of claims 1 or 2, characterised in that the force generation device is a mechanically adjustable spindle.
5. The roll stand according to one of the preceding claims, characterised in that the back-up roll (8, 9, 10, 11) is borne by a support beam (12, 13, 14, 15) and that the force generation device acts on said support beam (12, 13, 14, 15).
6. The roll stand according to claim 5, characterised in that a bearing arrangement (18) is provided in which the back-up roll (8, 9, 10, 11) is supported, at least in certain sections along its longitudinal extension, by the support beam (12, 13, 14, 15).
7. The roll stand according to claim 6, characterised in that the bearing arrangement is provided by at least one hydrostatic bearing (18).
8. The roll stand according to claim 6, characterised in that the bearing arrangement consists of roller bearings (118) which are arranged so as to be regularly spaced apart along the back-up roll (8, 9, 10, 11).
9. The roll stand according to claims 2 and 5, characterised in that the support beam (12, 13, 14, 15) is divided into two detachably interconnected components (12a, 12b) in longitudinal direction of

the back-up roll (8, 9, 10, 11), and in that the first component (12a) bears the back-up roll (8, 9, 10, 11) and the second component is coupled to the force generation device.

10. The roll stand according to claim 6, characterised in that the first component which bears the back-up roll (8, 9, 10, 11) is held to the second component (12b) of the support beam (12, 13, 14, 15) so as to be slidable along the longitudinal direction of said first component.
11. The roll stand according to one of claims 5 to 10, characterised in that along the support beam (12, 13, 14, 15), several force generation devices are arranged so as to be spaced apart from each other.

SI/cs 990516WO

28 July 2000

ABSTRACT

The invention relates to a roll stand comprising a pair of work rolls 1, 2 for rolling a metal strip B, comprising back-up rolls 8, 9, 10, 11 which provide lateral support to their respectively allocated work rolls 1, 2, with support force directed towards the work rolls 1, 2 being able to be applied to said back-up rolls by means of a force generation device, and comprising support rolls or intermediate rolls 3, 4 which are borne by a chock which can be slid into the roll stand W1, W2 in the direction of the longitudinal axis of said chock 7, and wherein said chock can be withdrawn from said roll stand, with each support roll or intermediate roll supporting an associated work roll 1, 2 in a direction which is essentially perpendicular to the direction of movement of the metal strip B. In such a roll stand, changing of the rolls can be carried out more quickly and easily in that the back-up rolls 8, 9, 10, 11 can be positioned from an idle position in which they are arranged outside the region where the chock 7 of the support roll or intermediate roll 3, 4 moves during slide-in or withdrawal, to an operating position in which they rest against the work roll 1, 2.

**Fig. 1 is provided for the Abstract.**

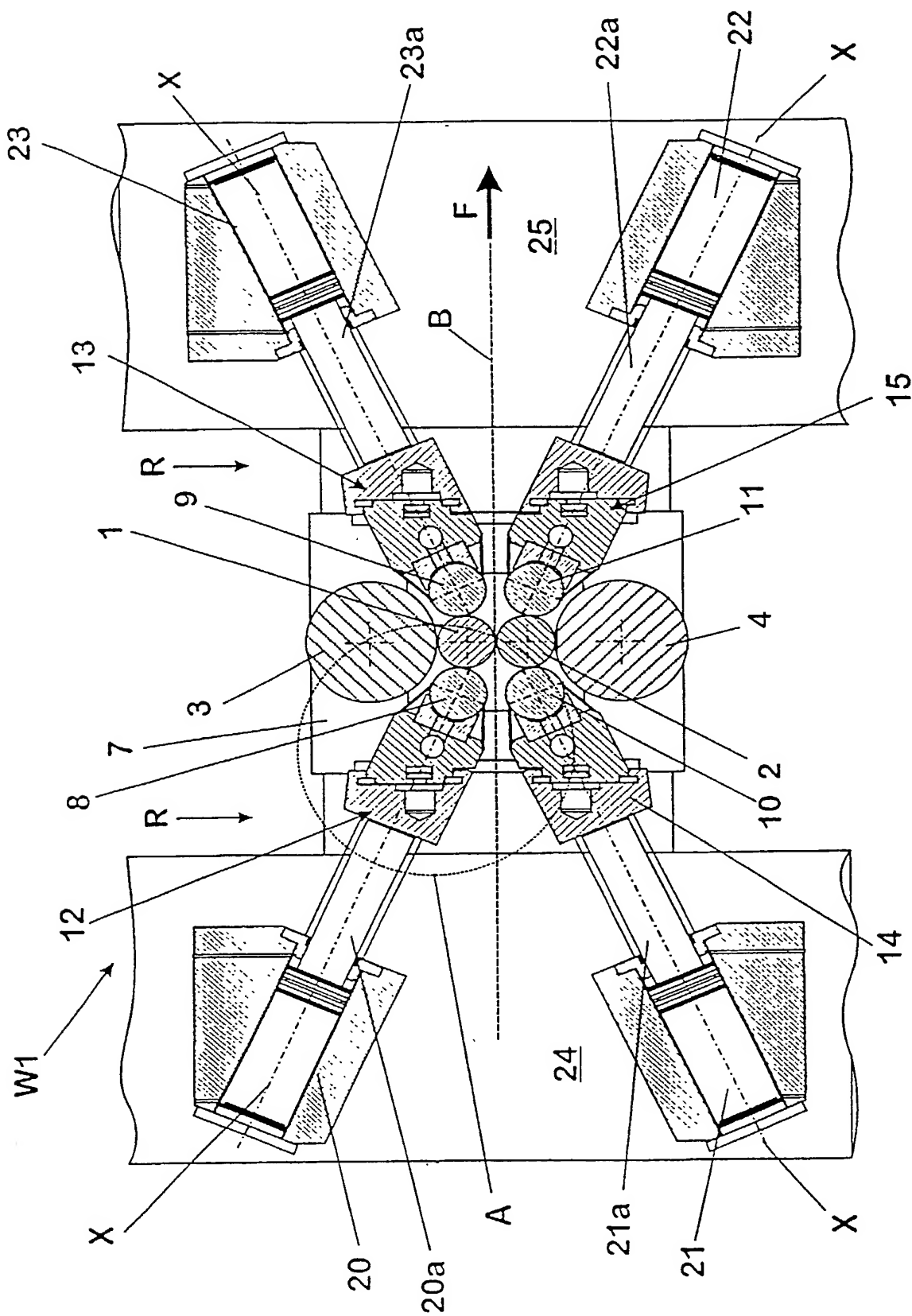
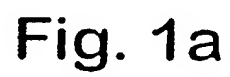


Fig. 1





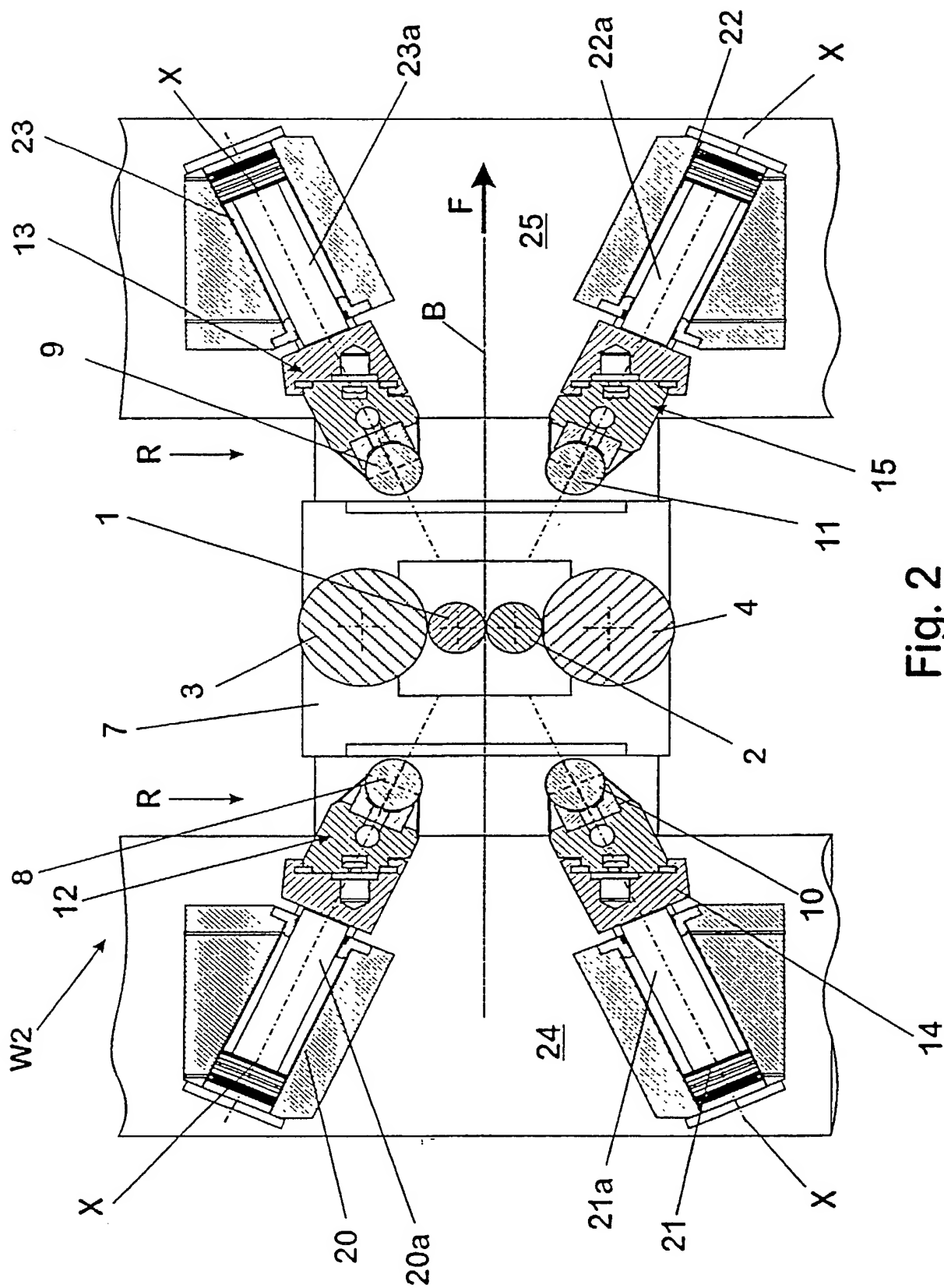


Fig. 2

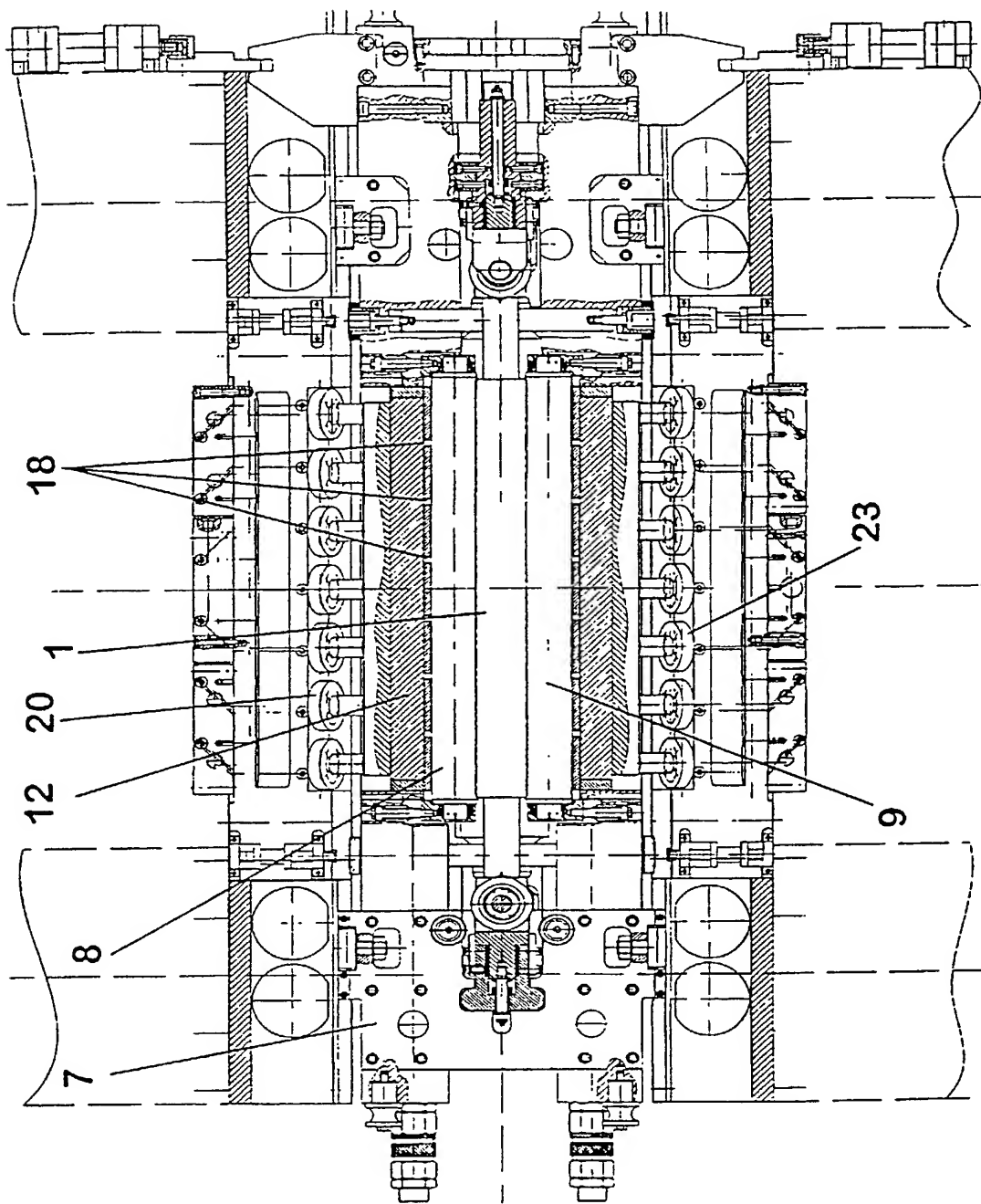


Fig. 3

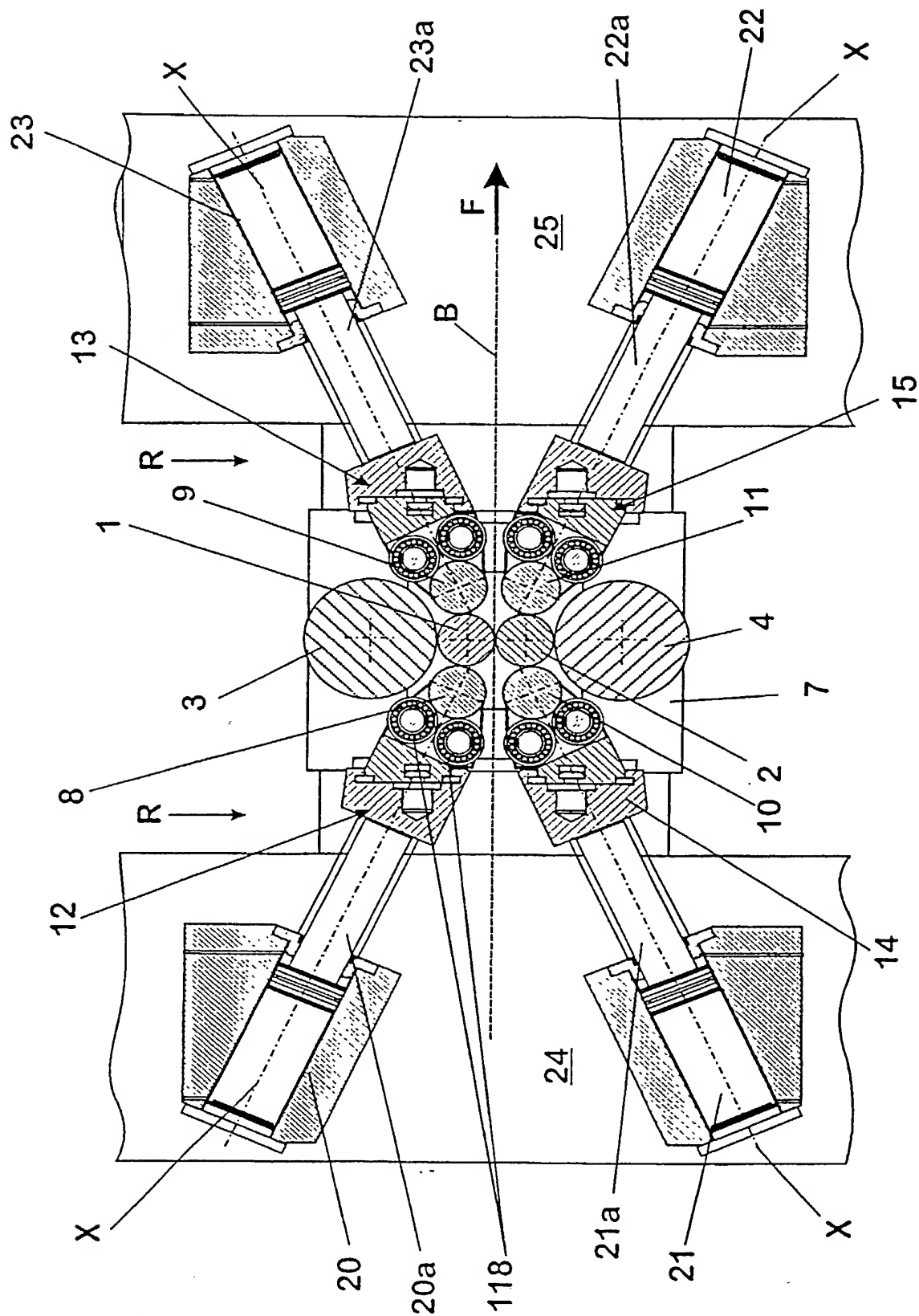


Fig. 4

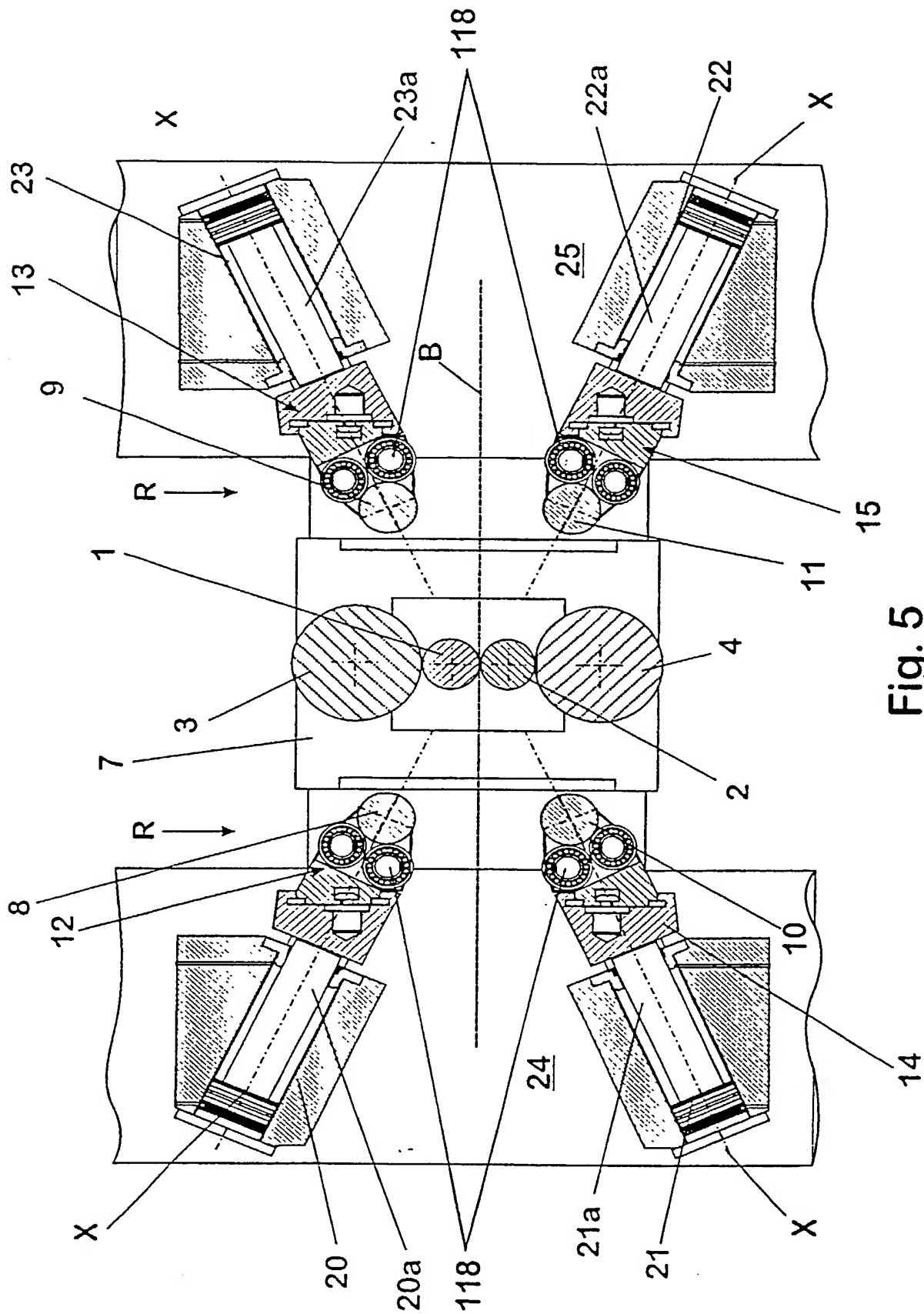


Fig. 5

10088277 .061902

Attorney Docket No. 20496-323

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

10/088277  
19 June 2002

Patent Application of :	Bernd BERGER, et al.
Serial No. :	10/088,277
Title :	ROLL STAND

**APPOINTMENT  
OF ASSOCIATE  
AGENT**

Assistant Commissioner for Patents  
Box PCT  
Washington, D.C. 20231


Sir:

The undersigned, attorney of record in this case, hereby appoints the following associate agent to prosecute this application and to transact all business in the U.S. Patent and Trademark Office in connection therewith:

Silvia Salvadori (Reg. No. 48,265)

Respectfully submitted,  
PROSKAUER ROSE LLP  
Attorneys for Applicant(s)

By: \_\_\_\_\_

  
Gregg I. Goldman  
Reg. No. 38,896

Date: June 13, 2002

PROSKAUER ROSE LLP  
1585 Broadway  
New York, N.Y. 10035

(212) 969-3000

## DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter, which is claimed and for which a patent is sought on the invention entitled:

### ROLL STAND

the specification of which is attached hereto unless the following box is checked:

  X   was filed on August 1, 2000 as United States Application Number  
or PCT International Application Number PCT/EP00/07431 and was amended  
on March 14, 2002 (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified, by checking the box, any foreign application for patent or inventor's certificate, or PCT International Application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

<u>199 44 612.1</u> (Number)	<u>Germany</u> (Country)	<u>17/9/1999</u> (Day/Month/Year Filed)
<u>PCT/EP00/07431</u> (Number)	<u>WIPO</u> (Country)	<u>1/08/2000</u> (Day/Month/Year Filed)

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

\_\_\_\_\_  
(Application Number)

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(Filing Date)

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(Application Number)

\_\_\_\_\_  
(Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

\_\_\_\_\_  
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(Filing Date)

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(Status--patented,  
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I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

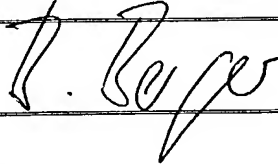

**Charles Guttman, Reg. No. ~~29,161~~;**  
**Kenneth Rubenstein, Reg. No. ~~30,586~~;**  
**Evan L. Kahn, Reg. No. ~~35,912~~;**  
**Anthony C. Coles, Reg. No. ~~34,139~~;**  
**Gregg I. Goldman, Reg. No. ~~38,896~~;**  
**Rachel S. Watt, Patent Agent, Reg. No. ~~46,186~~;**  
**Manuel C. Nelson, Reg. No. ~~44,969~~;**  
**Tzvi Hirshaut, Reg. No. ~~38,732~~;**  
**Louis Greco, Reg. No. ~~41,799~~; and**  
**John Stellabotte, Reg. No. ~~47,969~~**  
**Geoffrey W. Lin, Reg. No. ~~46,874~~**

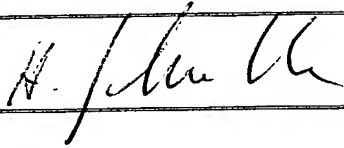
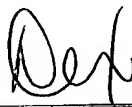
(TV)

Address all telephone calls to **Charles Guttman** at telephone number: (212) 969-3180  
 Address all correspondence to **Proskauer Rose LLP**

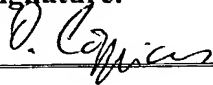

**1585 Broadway**  
**New York, New York 10036**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of the first or sole inventor (given name, family name): <u>Bernd BERGER</u>	
Inventor's signature: 	Date: 27.03.2002
Residence: <u>Kaarst, Germany</u> 	Citizenship: Germany
Post Office Address: Am grünen Weg 17, D-41564, Kaarst, Germany	

Full name of the second inventor (given name, family name): <u>Heinrich SCHULTE</u>	
Inventor's signature: 	Date: 2.4.2002
Residence: <u>Arnsberg, Germany</u> 	Citizenship: Germany
Post Office Address: Kronenstrasse 63a, D-59757, Arnsberg, Germany	



<b>Full name of the third inventor (given name, family name):</b> <u>Damian CÖPPICUS</u>	
<b>Inventor's signature:</b> 	<b>Date:</b> 28.03.2002
<b>Residence:</b> <u>Menden, Germany</u> 	<b>Citizenship:</b> Germany
<b>Post Office Address:</b> Gerhard-Hauptmann-Strasse 7, D-58710, Menden, Germany	